

## Claims

1. A pen-shaped optical mouse for displaying a pointer or cursor on a computer monitor at a desired position in accordance with a movement thereof detected  
5 using a reflected light, the optical mouse comprising:

a pen-shaped mouse body;

a transparent optical tip member mounted to one end of the mouse body;

an illuminating unit mounted in the mouse body, and  
10 adapted to irradiate light through the optical tip member onto a reflection surface arranged outside the mouse body, the illuminating unit including a light emitter, an optical fiber for guiding light emitted from the light emitter, and a prism arranged at an output end of the optical fiber;

15 a condenser lens mounted in the mouse body, and adapted to allow light reflected from the reflection surface to pass therethrough;

a bundle optical fiber for guiding the light passing through the condenser lens;

20 an imaging unit for receiving the light emerging from the bundle optical fiber, thereby forming an image;

an image sensor for receiving light outputted from the imaging unit, converting the received light into an electrical signal; and

25 a microcomputer for analyzing pattern information of

the reflection surface inputted to the image sensor, based on the electrical signal outputted from the image sensor, detecting a moving direction and distance of the mouse, based on the analyzed pattern information, and transmitting  
5 information about the moving direction and distance to a computer body.

2. A pen-shaped optical mouse for displaying a pointer or cursor on a computer monitor at a desired position in accordance with a movement thereof detected  
10 using a reflected light, the optical mouse comprising:

a pen-shaped mouse body;

a transparent optical tip member mounted to one end of the mouse body;

an illuminating unit mounted in the mouse body, and  
15 adapted to irradiate light onto a reflection surface arranged outside the mouse body, the illuminating unit including a light emitter, an optical fiber for guiding light emitted from the light emitter, and a prism arranged at an output end of the optical fiber;

20 a condenser lens mounted in the mouse body, and adapted to allow light reflected from the reflection surface to pass therethrough via the optical tip member;

a bundle optical fiber for guiding the light passing through the condenser lens;

25 an imaging unit for receiving the light emerging from

the bundle optical fiber, thereby forming an image;

an image sensor for receiving light outputted from the imaging unit, converting the received light into an electrical signal; and

5 a microcomputer for analyzing pattern information of the reflection surface inputted to the image sensor, based on the electrical signal outputted from the image sensor, detecting a moving direction and distance of the mouse, based on the analyzed pattern information, and transmitting  
10 information about the moving direction and distance to a computer body.

3. A pen-shaped optical mouse for displaying a pointer or cursor on a computer monitor at a desired position in accordance with a movement thereof detected  
15 using a reflected light, the optical mouse comprising:

a pen-shaped mouse body;

a ball rotatably fitted in one end of the mouse body, the ball having a pattern on a surface thereof;

an illuminating unit mounted in the mouse body, and  
20 adapted to irradiate light onto the ball, the illuminating unit including a light emitter, an optical fiber for guiding light emitted from the light emitter, and a prism arranged at an output end of the optical fiber;

a condenser lens mounted in the mouse body, and  
25 adapted to allow light reflected from the ball to pass

therethrough;

a bundle optical fiber for guiding the light passing through the condenser lens;

an imaging unit for receiving the light emerging from the bundle optical fiber, thereby forming an image;

an image sensor for receiving light outputted from the imaging unit, converting the received light into an electrical signal; and

a microcomputer for analyzing pattern information of the ball surface inputted to the image sensor, based on the electrical signal outputted from the image sensor, detecting a moving direction and distance of the mouse, based on the analyzed pattern information, and transmitting information about the moving direction and distance to a computer body.

4. The pen-shaped optical mouse according to any one of claims 1 to 3, wherein the light emitter comprises an LED.

5. The pen-shaped optical mouse according to any one of claims 1 to 3, wherein the imaging unit and image sensor have optical axes aligned with each other, respectively.

6. The pen-shaped optical mouse according to any one of claims 1 to 3, wherein:

the imaging unit is arranged such that it refracts the light received thereto; and

the image sensor is arranged such that it receives the refracted light from the imaging unit.

5           7. The pen-shaped optical mouse according to any one of claims 1 to 3, further comprising:

a first click button adapted to sense a depression of the optical tip member, the first click button being clicked when it senses the depression of the optical tip member; and

10           a second click button mounted to an outer surface of the mouse body such that it is clicked when it is depressed by a user's finger.

15           8. The pen-shaped optical mouse according to any one of claims 1 to 3, further comprising a wheel button sensor adapted to perform a scroll function, the wheel button sensor including:

20           a wheel fitted in an opening formed at a side wall of the mouse body such that it is rotatable about an axis thereof, while being partially protruded from the opening in an outward direction of the mouse body, the wheel having a plurality of through holes extending axially throughout the thickness of the wheel while being circumferentially arranged;

a light emitter mounted in the mouse body, and adapted to irradiate light onto the wheel; and

an optical sensor adapted to receive light beams from the light emitter passing through respective through holes  
5 of the wheel, thereby detecting a rotating direction and angle of the wheel.

9. The pen-shaped optical mouse according to claim 7, further comprising a wheel button sensor adapted to perform a scroll function, the wheel button sensor including:

10 a wheel fitted in an opening formed at a side wall of the mouse body such that it is rotatable about an axis thereof, while being partially protruded from the opening in an outward direction of the mouse body, the wheel having a plurality of through holes extending axially throughout  
15 the thickness of the wheel while being circumferentially arranged, the wheel being always urged by a spring such that it is inwardly retracted into the mouse body against an elastic force of the spring when it is depressed, while being outwardly protruded from the mouse body by virtue of  
20 the elastic force of the spring, so that it returns to its original state;

a light emitter mounted in the mouse body, and adapted to irradiate light onto the wheel; and

an optical sensor adapted to receive light beams from  
25 the light emitter passing through respective through holes

of the wheel, thereby detecting a rotating direction and angle of the wheel,

wherein the first click button is arranged to be clicked when the wheel is depressed.

5           10. The pen-shaped optical mouse according to any one of claims 1 to 3, further comprising a contact button sensor adapted to perform a scroll function, the contact button sensor including:

10           a transparent button mounted to a side wall of the mouse body such that it can be touched by a finger of the user grasping the mouse;

          a light emitter mounted in the mouse body, and adapted to irradiate light through the transparent button onto the user's finger touching the transparent button;

15           an optical fiber adapted to receive light passing through the transparent button after being reflected from the user's finger, and to guide the reflected light to a position sensor; and

20           the position sensor adapted to detect motion of the user's finger, based on light information received thereto via the optical fiber.

          11. The pen-shaped optical mouse according to claim 7, further comprising a contact button sensor adapted to perform a scroll function, the contact button sensor

including:

5 a transparent button mounted to a side wall of the mouse body such that it can be touched by a finger of the user grasping the mouse, the transparent button being always urged by a spring such that it is inwardly retracted into the mouse body against an elastic force of the spring when it is depressed, while being outwardly protruded from the mouse body by virtue of the elastic force of the spring, so that it returns to its original state;

10 a light emitter mounted in the mouse body, and adapted to irradiate light through the transparent button onto the user's finger touching the transparent button;

15 an optical fiber adapted to receive light passing through the transparent button after being reflected from the user's finger, and to guide the reflected light to a position sensor; and

the position sensor adapted to detect motion of the user's finger, based on light information received thereto via the optical fiber,

20 wherein the first click button is arranged to be clicked when the transparent button is depressed.

12. The pen-shaped optical mouse according to claim 1 or 2, wherein the illuminating unit is arranged such that the light irradiated therefrom is incident onto the reflection surface at an incidence angle of 14 to 21° when  
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the optical mouse forms an angle of 40 to 70° with respect to the reflection surface.